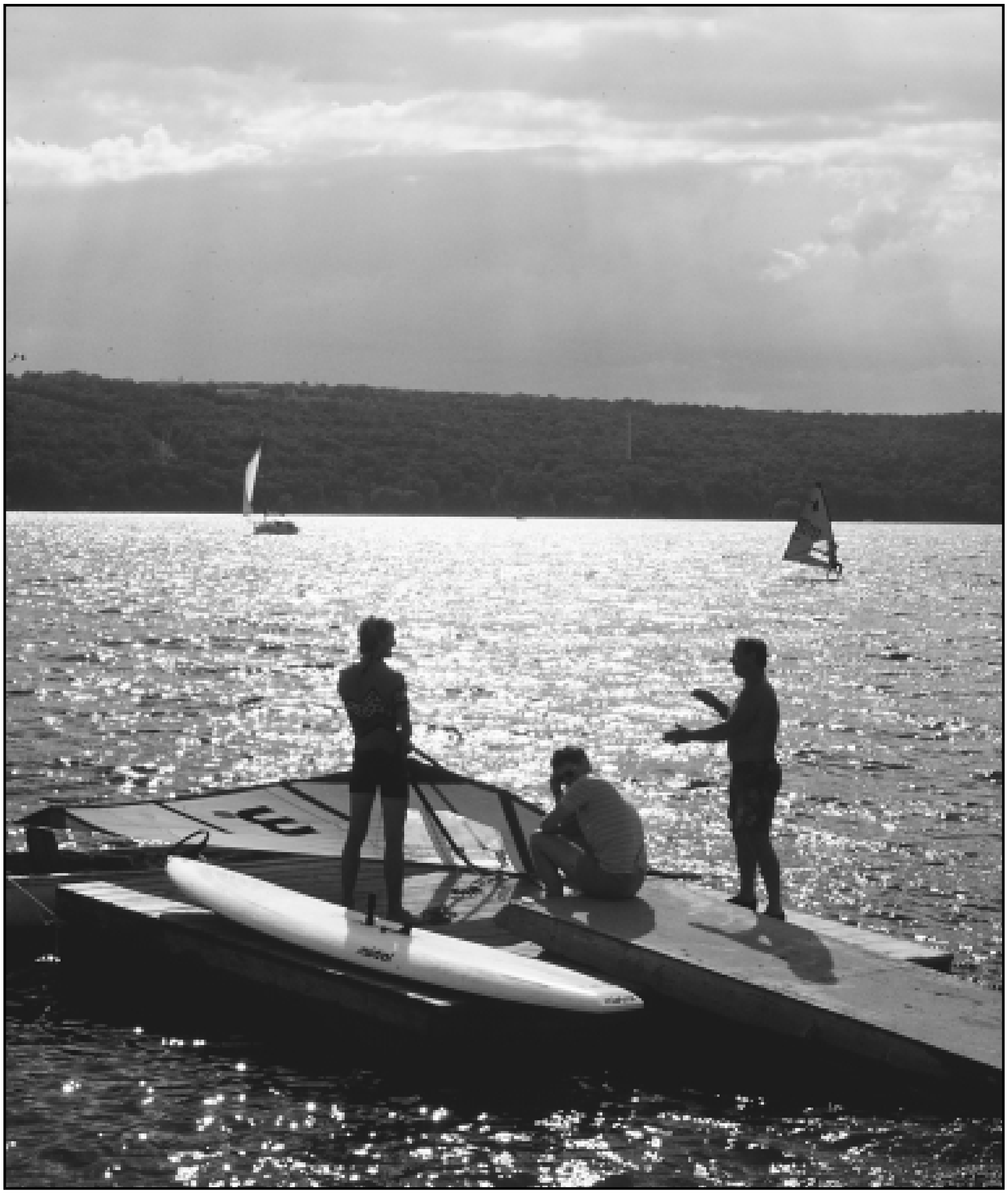
This document contains data extracted from the EPA “National Water Quality Inventory, 1998 Report To Congress, Ground Water and Drinking Water Chapters,” published in August 2000. The reference number is EPA 816-R-00-013. You can find the entire document at http://www.epa.gov/safewater/sourcewater.cfm?action=Publications.

National Water Quality Inventory, 1998 Report to Congress, Ground Water and Drinking Water Chapters

Drinking Water Quality Programs

August 2000



John McShane, Cayuga Lake, Ithaca, NY

Drinking Water Quality Programs

Drinking Water Source Assessments

The Safe Drinking Water Act (SDWA) calls for states to determine the susceptibility of waters to contamination, while Section 305(b) of the Clean Water Act calls for them to assess the ability of waters to support drinking water use. States may prioritize their water resources and perform drinking water use support assessments for a limited percentage of their water resources. They are then encouraged to expand their drinking water assessment efforts to include additional waters at each subsequent reporting cycle. EPA recommends prioritization based on waters of greatest drinking water demand, with further prioritization with respect to vulnerability or other state priority factors. In addition, states are encouraged to use a tiered approach in the assessment. This tiered approach accommodates the different types of data currently available to states and allows for differing levels of assessment.

States use the general criteria outlined in Table 10 to determine the degree of drinking water use support for waterbodies in their state. These criteria may be modified by the states to fit their individual situations.

Table 10. Criteria to Determine Drinking Water Use Support

Classification	Monitoring Data		Use Support Restrictions
Full support	Contaminants do not exceed water quality criteria	and/or	Drinking water use restrictions are not in effect
Full support but threatened	Contaminants are detected but do not exceed water quality criteria	and/or	Some drinking water use restrictions have occurred and/or the potential for adverse impacts to source water quality exists
Partial support	Contaminants exceed water quality criteria intermittently	and/or	Drinking water use restrictions resulted in the need for more than conventional treatment
Nonsupport	Contaminants exceed water quality criteria consistently	and/or	Drinking water use restrictions resulted in closures
Unassessed	Source water quality has not been assessed		

Summary of State Drinking Water Assessments

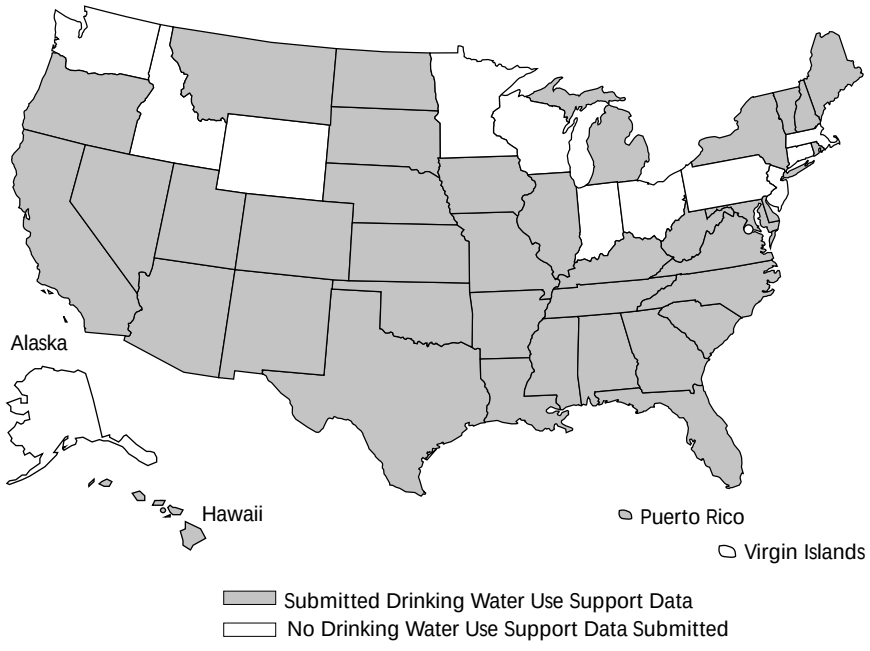
Thirty-eight states, tribes, or territories submitted drinking water use data in their reports. Figure 27 shows which states submitted drinking water data for rivers and streams and/or lakes and reservoirs. Table 11 shows the total number of miles of rivers and streams and acres of lakes and reservoirs assessed and the degree of drinking water use support for the entire nation. The majority of waterbodies assessed, 87% of rivers and streams and 82% of lakes and reservoirs, are fully supporting of drinking water use. Only 3% of assessed rivers and streams and 5% of lakes and reservoirs do not support drinking water use.

A large improvement was seen between the drinking water use support data reported by the states in the 1998 305(b) report and that reported previously. In the early 1990s, only a small percentage of rivers, streams, lakes, and reservoirs were assessed for drinking water use. In 1998, more states reported on how they classified waterbodies for drinking water use and on sources of water contamination. The increased data resulted in a more accurate framework for assessing drinking water use support in the nation.

However, 12 states did not report data on drinking water use support. Many of the 38 states that reported data did not present any information on how they classified their waterbodies for drinking water use support or on sources of water contamination. This lack of information complicates data interpretation and presents challenges for accurately assessing and representing drinking water use support.

Figure 27

States Submitting Drinking Water Use Support Data in Their 305(b) Reports



Source: 1998 305(b) reports submitted by states.

Sources of Drinking Water Use Impairment

Each state analyzed for contaminants of concern to them, and used different criteria for assessing drinking water use impairment. In addition, many states did not identify the particular contaminants that caused drinking water use impairment. Thus, it is not possible to present quantitative data on this issue. However, based on the limited number of states identifying contaminants, Table 12 summarizes all of the contaminants cited as

causing drinking water use impairment.

Ensuring Safe Drinking Water

Thanks to decades of effort by public and private organizations and the enactment of drinking water legislation, most Americans can turn on their taps without fear of receiving unsafe water. Ensuring consistently safe drinking water requires the cooperation of federal, state, tribal, and municipal governments to protect the water as it moves through three stages of the system—the raw source water, the water treatment plant, and the pipes that deliver finished water to consumers' taps. Polluted source waters greatly increase the level and expense of treatment needed to provide finished water that meets public health standards.

The passage of the SDWA Amendments of 1996 brought substantial changes to the national drinking water program for water utilities, states, and EPA, as well as greater protection and information to the 250 million Americans served by public water systems.

Source Water Protection

The SDWA Amendments establish a strong new emphasis on preventing contamination problems through source water protection and enhanced water system management. The states are central in creating and focusing prevention programs and helping water systems improve their operations to avoid contamination problems. States are assessing the susceptibility to contamination of the source waters supplying public water systems. These assessments will provide the information necessary for states to develop tailored monitoring programs and for water systems to seek help from states in protecting source water or initiating local government efforts. Every state took advantage of the opportunity to use a portion of the Drinking Water State Revolving Fund to initiate source water assessments in FY 97.

To emphasize its commitment to source water protection, EPA included a source water protection goal in *Environmental Goals for America With Milestones for 2005*, which was originally released in

Table 11. National Drinking Water Use Support

	Fully Supporting	Threatened	Partially Supporting	Not Supporting	Total Assessed
Rivers and Streams					
Miles	122,318	5,844	8,164	4,616	140,954
Percentage	87	4	6	3	—
Lakes and Reservoirs					
Acres	6,926,031	303,374	794,573	394,307	8,418,286
Percentage	82	4	9	5	—

Table 12. Sources of Drinking Water Use Impairment

Contaminant Group	Specific Contaminant	
Pesticides	Atrazine Metolachlor Triazine	Molinate Ethylene dibromide
Volatile organic chemicals	Trichloroethylene Tetrachloroethylene 1,1,1-Trichloroethane *cis*-1,2-Dichloroethylene Trihalomethanes Carbon tetrachloride Ethylbenzene 1,1,2,2-Tetrachloroethane	Dichloromethane 1,1-Dichloroethane 1,1-Dichloroethylene Toluene Benzene Dichlorobenzene Methyl(tert)butyl ether Xylene
Inorganic chemicals	Arsenic Nitrates Iron Copper Chloride	Fluoride Manganese Lead Sodium
Microbiological contaminants	Exceedance of total coliform rule	Exceedance of fecal coliform rule

Protecting Sources of Drinking Water

Introduction

In the United States today, approximately 11,000 community water systems serving over 160 million people rely on lakes, reservoirs, and rivers as their main sources of drinking water. There is a growing recognition that addressing the quality and protection of these water sources can prevent contamination, thus reducing costly additional treatment and cleanup. Across the country, drinking water utilities are engaged in innovative and successful source water protection programs. These programs rely heavily on partnerships with local governments and often involve working closely with watershed councils, entering into land exchange agreements with land management agencies, and engaging with local farmers to implement best management practices aimed at protecting sources of drinking water.

The local actions that help protect sources of drinking water can generally be classified as: (1) creating partnerships, (2) assessing watersheds, (3) managing land use in watersheds, and (4) acquiring land.

Creating Partnerships

Instituting drinking water protection with a source water protection program involves balancing competing interests and conflicting demands within the watershed. This can be done through watershed planning committees or simply by establishing good, long-term relationships among the partners, which encourages a level playing field for reconciling the community's needs. It is important for affected parties—water utilities, local and state governments, watershed councils, nongovernment organizations, and others—to share information effectively.

Example: Creating Partnerships with Groups and Individuals, Chester Water Authority, Chester, Pennsylvania

To protect the water quality of its Octoraro Reservoir, the Chester Water Authority has forged a strong and lasting partnership with the Octoraro Watershed Association. This partnership bridges the gap between the citizens who get their drinking water from the Octoraro

HIGHLIGHT  GHT HIGHLIGHT

Reservoir but do not live in the watershed and the farmers and landowners who live in the watershed but do not get their drinking water from the reservoir. The Chester Water Authority and the Octoraro Watershed Association have jointly supported many education and outreach programs, and the Authority has provided a meeting place and administrative support services to the Association. The Association promotes agricultural best management practices (BMPs) such as streambank fencing, barnyard management, crop rotation, and the establishment of forested riparian buffers throughout the watershed. One of the Association's greatest challenges has been convincing farmers that the BMPs will benefit both them and the watershed. Sharing success stories is often a successful way to garner support for BMP implementation. The Association also helps willing farmers seek financial aid for their BMPs. Funds are often available from local, state, and federal partners.

Assessing Watersheds

One of the keys to a strong watershed protection program is the assessment of the area. It is important to be able to identify watershed problems and target protection efforts. Watershed delineation and assessment are tools used to achieve these goals. Many water utilities use geographic information systems (GIS) to delineate their watersheds. Afterwards, local managers can use zoning maps to identify land use patterns within the watersheds and identify potential sources of contamination that pose the greatest threats to the drinking water supply. A comprehensive monitoring plan is also useful for identifying watershed problems.

Example: Monitoring Data to Support Protective Water Quality Standards, Portland Water Bureau, Portland, Oregon

The Portland Water Bureau draws its water from the Bull Run River in the Mt. Hood National Forest. The U.S. Forest Service (USFS) administers the watershed under several legal authorities including the Bull Run Management Act (P.L. 95-200). This act sets the production of pure, clean, raw, potable

water as the principal federal management objective for the area. Consequently, the USFS must adopt standards specific to the Bull Run watershed that are more stringent than its national standards. The USFS, the Portland Water Bureau, and the U.S. Geological Survey share the monitoring responsibilities of sampling, data collection and analysis, and database management. Monitoring is critical to unfiltered water systems, serving as an early warning of turbidity-producing events such as landslides and storm-induced erosion. By tracking turbidity levels during and after these events, facility operators can either divert heavily contaminated waters or temporarily switch to an alternative ground water source. The Portland Water Bureau is also using the monitoring program to estimate the sediment loading from abandoned roads in the national forest.

Managing Land Use in Watersheds

The type of land use in a drinking water supply source area, whether it is rural, urban, forested, and/or farmed, presents a challenge to managing the water source. Utilities whose water sources are in a forested area usually must contend with logging, erosion, and timber management. Systems whose sources are in rural or suburban areas may need to deal with septic systems, agricultural runoff, and erosion or recreational uses such as swimming, hiking, and mountain biking. In urban areas, utilities need to address issues such as storm water drainage, runoff from pavement, and increasing development. Solutions to the pollution from these various land uses range from simple, creative ideas that other systems can easily adopt, to capital-intensive projects that require significant funding commitments.

Example: Managing Urban Storm Water, Massachusetts Water Resources Authority, Boston, Massachusetts

Pollutant runoff from construction sites after large rainfall events can stress drinking water treatment facilities. Although the Massachusetts Water Resources Authority does not regulate storm water releases from construction sites, the Metropolitan District Commission (MDC) Division of Watershed Management works with petitioners to review all plans for the design and construction of storm water and erosion control projects. These control projects are required under the state's Watershed Protection Act and Wetlands Protection Act. In addition to reviewing plans, annual watershed sanitary surveys help MDC staff identify areas of concern. Once a specific threat to human health is identified, the MDC works with the responsible party to mitigate the situation. In the future, MDC plans to analyze pollutant loading at the subbasin level and recommend

BMPs. The Massachusetts Water Resources Authority and MDC plan to conduct workshops to help municipalities implement the BMPs and may provide technical and financial assistance.

Acquiring Land

One way to solve the problem of competing land uses within a watershed is to acquire all the land surrounding a water source. Rather than negotiate with individual landowners, the system buys the land surrounding a surface water source. This solution is simple, yet often difficult to implement.

Example: Land Acquisition Program Targets High-Priority Parcels, New York City Department of Environmental Protection, New York, New York

New York City's water utility, the Department of Environmental Protection (DEP), has embarked on a 10-year program of land acquisition within its watersheds. DEP has committed $250 million to acquire property associated with the Catskill and Delaware River supply systems. These supplies spread over 1,600 square miles west of the Hudson River and provide 90% of New York City's water. An additional $10 million has been set aside for the same purpose in the Croton Watershed, which lies east of the Hudson. This program operates under a 10-year water supply permit from the New York State Department of Environmental Conservation (NYSDEC) issued in 1997. This permit enables DEP to acquire, through purchase or conservation easements, undeveloped land near reservoirs, wetlands, and watercourses, as well as land with other features sensitive to water quality. No land will be taken through eminent domain, and fair market value is paid for all land. The watersheds have been divided into priority areas for acquisition, based on natural features and proximity to reservoirs, intakes, and DEP's distribution system.

Conclusions

The examples provided here are just a sampling of local actions being taken across the country to protect sources of drinking water. The common thread among the examples is the coordination of a drinking water utility's goals with local watershed management initiatives aimed at aquatic ecosystem restoration and protection.

This highlight was drawn from *Protecting Sources of Drinking Water: Selected Case Studies in Watershed Management* (EPA 816-R-98-019, April 1999). For more information on EPA's efforts to protect drinking water sources, visit the Office of Ground Water and Drinking Water on the Internet at *http://www.epa.gov/ogwdw/protect.html*.

Drinking Water Standards

EPA sets national primary drinking water standards through the establishment of maximum contaminant levels (MCLs) and through treatment technique requirements.

MCLs are the maximum permissible levels of contaminants in drinking water that is delivered to any user of a public water system. The MCLs provide enforceable standards that protect the quality of the nation's drinking water.

Treatment techniques are procedures that public water systems must follow to ensure a contaminant is limited in the drinking water supply. EPA is authorized to establish a treatment technique when it is not economically or technically feasible to ascertain the level of a contaminant.

June 1996. The revised goal states that "by the year 2005, 50% of the population served by community water systems will receive their water from systems with source water protection programs in place."

Source water assessment and protection programs provided for under the 1996 Amendments to the SDWA offer opportunities and tools to protect drinking water at the source. They offer a unique opportunity to integrate not only drinking water programs so that they operate in a coordinated fashion, but also to integrate drinking water, clean water, coastal, solid and hazardous waste, agricultural, and other environmental management programs to better protect public health and the environment while reducing duplication of effort and program costs.

Drinking Water Concerns

Over 90% of people in the United States get their drinking water from public water supplies. Although most public water supplies meet drinking water standards, a diverse range of contaminants can affect drinking water quality. EPA's Science Advisory Board concluded that drinking water contamination is one of the greatest environmental risks to human health. This conclusion is due, in part, to the variability in quality of the source of water supplying the drinking water. It is also due to the potential for contamination in the delivery system as the water travels from the treatment plant to the consumer's tap.

Under the Safe Drinking Water Act, a public water system is defined as a system that has at least

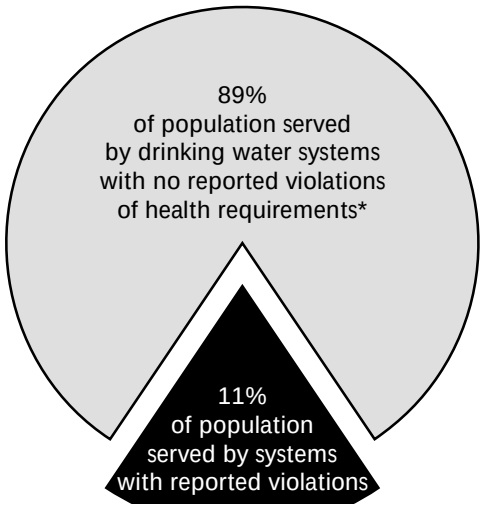
Figure 28

Figure 28

Compliance of Community Drinking Water Systems with Health Requirements in 1998

Population served by community drinking water systems in 1998 = 253 million

Number of community drinking water systems = 54,367



**As much as one-fourth of the community water systems did not complete all required monitoring. The compliance status of some of those could not be assessed from the data reported.*

Source: U.S. EPA, 1999, Office of Ground Water and Drinking Water, Washington, DC.

15 service connections or serves an average of at least 25 people for at least 60 days per year. There are three types of public water systems:

- Community water systems are those that serve the same people year-round (e.g., cities, towns, villages, and mobile home parks).
- Nontransient noncommunity water systems are those that serve at least 25 of the same people for at least 6 months of the year (e.g., schools, day care centers).
- Transient noncommunity water systems are those that serve transient populations (e.g., rest stops, campgrounds, and parks).

In 1998, 89% of the population served by community water systems (CWSs) received water that had no reported health-based violations (MCL or treatment technique violations). Ninety-one percent (91%) of the CWSs had no reported health-based violations (Figure 28). Of the 4,630 CWSs reporting health-based violations, 325 (7%) were systems serving 10,000 or more people. These systems together served 23 million people. The total coliform rule and the surface water treatment rule were violated most frequently by large water systems. Four percent of the 10,002 community water systems with a monitoring and reporting violation were large systems, serving a total of 22 million peple. The rules pertaining to synthetic organic carbon, volatile organic carbon, and the total coliform rule monitoring requirements accounted for most of these system's violations.

For public water systems in 1998, there were 128,459 violations reported by 36,467 of the 170,376 systems. Of those, 85% were violations of significant monitoring and reporting requirements and 12% were violations of MCL and treatment technique requirements. Eighty-five percent of these violations were in small systems serving 500 or fewer people.

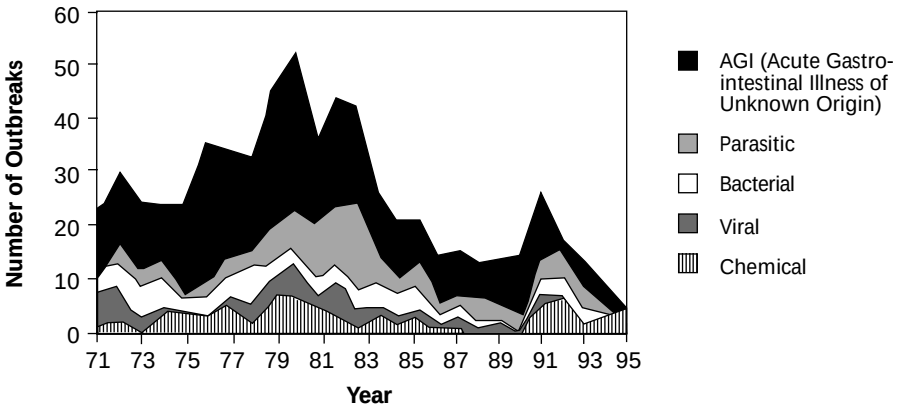
One risk from unsafe drinking water is exposure to waterborne pathogens, which can cause acute health problems requiring medical treatment. As shown in Figure 29, bacteria, viruses, parasitic pathogens, and chemical agents have all been shown to cause waterborne disease outbreaks.

For systems serving a large population, a waterborne disease outbreak can sharply impact a large number of people. The 1993 *Cryptosporidium* outbreak in Milwaukee, for example, affected more than 400,000 people, the largest waterborne disease outbreak ever reported in the United States.

The new amendments offer a unique incentive for water utilities and groups devoted to watershed protection to form partnerships and explore their common ground. After all, the goals of one group often affect the goals of the other. For instance, water utilities generally strive to keep treatment costs down, while watershed groups typically look for ways to address sources of contamination. Identifying such common pursuits stands to benefit everyone and, ultimately, the future of the nation's watersheds.

Figure 29

Waterborne Outbreaks in the United States by Year and Type



Source: Levy et al., 1998, Morbidity and mortality surveillance summaries. *Surveillance for Waterborne Disease Outbreaks*, Centers for Disease Control, Atlanta, GA, V. 47(SS-5): 1-34. *http://www.cdc.gov/epo/mmwr*